

## Incidence of surgical removal of impacted tooth in diabetic patients- Retrospective study

• **BathalaAnanya**

Saveetha Dental College ,Saveetha Institute of Medical And Technical Sciences,Saveetha UniversityChennai,Tamil Nadu.

• **Dr. Arun Murugaiyan\***

Senior Lecturer,Department of Oral and Maxillofacial surgery, Saveetha Dental College,Saveetha Institute of Medical And Technical Sciences,Saveetha University,Chennai,Tamil Nadu.

### Abstract

**Introduction** Impacted teeth is a disorder where the teeth are prevented from erupting into the oral cavity. They are caused by physical barriers such as adjacent teeth or when the tooth is angled away from a vertical position, even gums and impact jaw. Impacted teeth are usually painless but when infections of surrounding tissues occur, it results in severe pain. Diabetes mellitus has become an increasing health problem worldwide. This is characterized by the abnormal metabolism of proteins and carbohydrates leading to increased blood sugar level. This resultant hyperglycemia can contribute to microvascular complications.

**Aim** To determine the incidence of surgical removal of impacted teeth in diabetic patients.

**Material and methods** It is a single centered retrospective study conducted in a private dental institution, Chennai. The data was collected from the dental hospital management system, 42000 patient details were analysed between September 2020 to March 2021 out of which 400 patients who fulfilled the inclusion and exclusion criteria were included in the study. The data analysis was performed using SPSS software of version 19. The chi square test and pearson correlation was done. p value < 0.05 was considered statistically significant.

**Results** Among 400 patients, 40% were 35-45years and 60% were 46-60years.Prevalence of surgical extraction in mandibular right third molar(48) is 40%, maxillary right third molar(18) is 24%, maxillary left third molar(28) is 20% and mandibular left third molar(38) is 16%.

**Conclusion** Within the limits of the study, it can be concluded that healing was more satisfactory in 35-45 age group and dry socket was more prevalent in the 45-60 age group in diabetic patients with impaction.

**Key words:** Impacted teeth, third molar, diabetes patient, Novel analysis,

### Introduction

Impacted teeth is a disorder where the teeth are prevented from erupting into the oral cavity. They are caused by physical barriers such as adjacent teeth or when the tooth is angled away from a vertical position, even gums and impact jaw.(1) Lack of an adequate dental arch length and space in which to erupt is the main reason for the impacted teeth. Presence of impacted teeth predisposes the erupted adjacent teeth to periodontal disease and caries formation. Impacted teeth are usually painless but when infections of surrounding tissues occur, it results in severe pain.(2) Removal of impacted teeth is recommended in the case of certain pathological conditions such as nonrestorable caries or cysts.(3) Many studies have shown the mandibular last molar to be the most commonly impacted tooth followed by the maxillary third molars, the maxillary canines and the mandibular premolars.(4) In fact, 50% of upper third molars classified as impactions are normally developing teeth, most of which will erupt with minimal discomfort if not extracted prematurely.(5) Only 12% of truly impacted teeth are associated with pathological conditions such as cysts and damage to adjacent teeth. Completely unerupted wisdom teeth usually result in no symptoms, although they can sometimes develop cysts or neoplasms. Partially erupted wisdom teeth can develop cavities or pericoronitis.(6) This is no evidence of widespread third-molar infection and pathology or of medical necessity to justify so much surgery.(7) Most discomfort of erupting wisdom teeth is equivalent to teething and disappears on full eruption. Most infection of the gum tissue around the erupting or partially erupted teeth can be prevented by good oral hygiene, including toothbrushing.

Diabetes mellitus has become an increasing health problem worldwide.(8) This is characterized by the abnormal metabolism of proteins and carbohydrates leading to increased blood sugar level. This resultant hyperglycemia can contribute to microvascular complications. Diabetic patients are more susceptible to oral and dental problems and complications including the various oral soft tissue injuries and inflammatory conditions.(9) Normal fasting blood glucose is <100 mg/dl (63–99 mg/dl). Random blood glucose (2 h after meals) is <144 mg/dl. The patient is diagnosed with diabetes if fasting blood glucose  $\geq 126$  mg/dl or random blood glucose  $\geq 200$  mg/dl in addition to the presence of diabetes symptoms.

If fasting blood glucose level reaches 240 mg/dl this is a sign of out of control diabetes. The symptoms of high blood sugar can be mild, moderate, or severe. Mild to moderate symptoms are seen in people if their fasting blood glucose levels are 160–300 mg/dl. Symptoms at this stage include hunger, tremor or trembling, sweating, pale face, rapid heart rate, dizziness and weakness, blurred vision and confusion. Severe symptoms are noticeable if fasting blood glucose

levels are above 300 mg/dl. These include weight loss, dehydration, tiredness, poor concentration, irritability, and nervousness, irrational behavior, and personality changes, tingling in the mouth, and coordination problems. If blood glucose level tops 600 mg/dl (the condition is called diabetic hyperosmolar syndrome), Patient becomes confused, unconscious and ends up with diabetic coma. Coma happens as a result of a build-up of ketones (acid in the blood). People with uncontrolled diabetes are at high risk of infection and slow healing wounds. Systemic factors such as diabetes mellitus may contribute to the incidence of dry socket. This is due to the altered healing in diabetic patients. Delayed healing is reported as the well-known complication of oral surgeries in diabetic patients. The cut-off point of blood glucose level for an emergency tooth extraction is still arguable. (10),(11),(12),(13),(14–23)(24),(25–27).(28,29)  
The aim of this study is the incidence of surgical removal of impacted teeth in diabetic patient.

### Materials and methods

The study was conducted in a private dental institution, Chennai. The data was collected from a dental hospital management system. 42,000 patient details were analysed between September 2020 to January 2021 out of which 400 patients who fulfilled the inclusion and exclusion criteria were included in the study. Inclusion criteria includes Demographic details of the patient, Mode of extraction ie, surgical removal of impacted teeth. Exclusion criteria include postoperative complications such as dry socket are excluded. Ethical clearance for this study was obtained from the institutional review board.

The data included a varied children population of age 3-6 years old predominantly South Indian. All the case sheets were reviewed and were cross verified by another examiner. The internal validity included diagnosed cases as per criteria, medical history, chief complaints and clinical findings.

The data collected was tabulated under following parameters: Age, Gender, Diabetic patients. The independent variables includes age, gender and dependent variables includes Diabetic patients. The data analysis was performed using SPSS software of version 19. The chi square test and pearson correlation was done .p value < 0.005 was considered statistically significant.

### Results

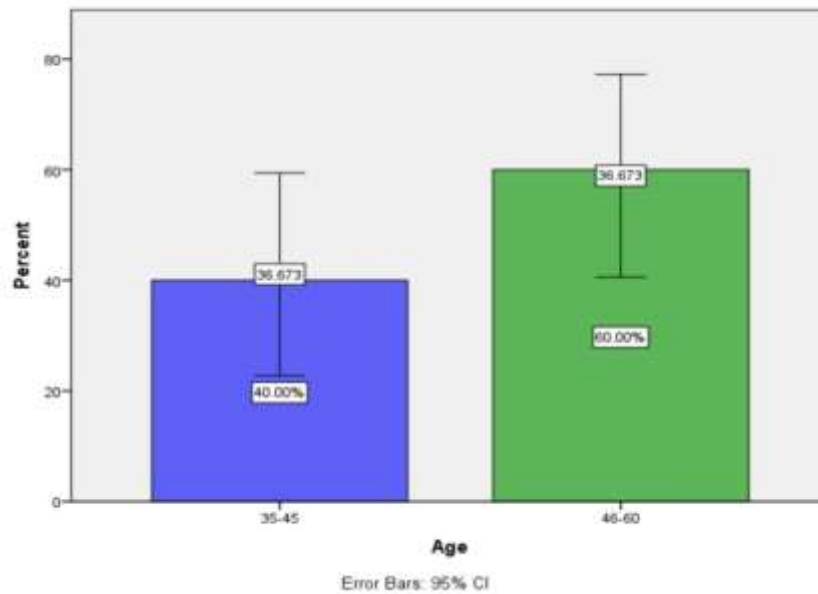


Figure 1- Bar graph showing the percentage distribution of age group , out of which 40% were 35-45years and 60% were 46-60years.

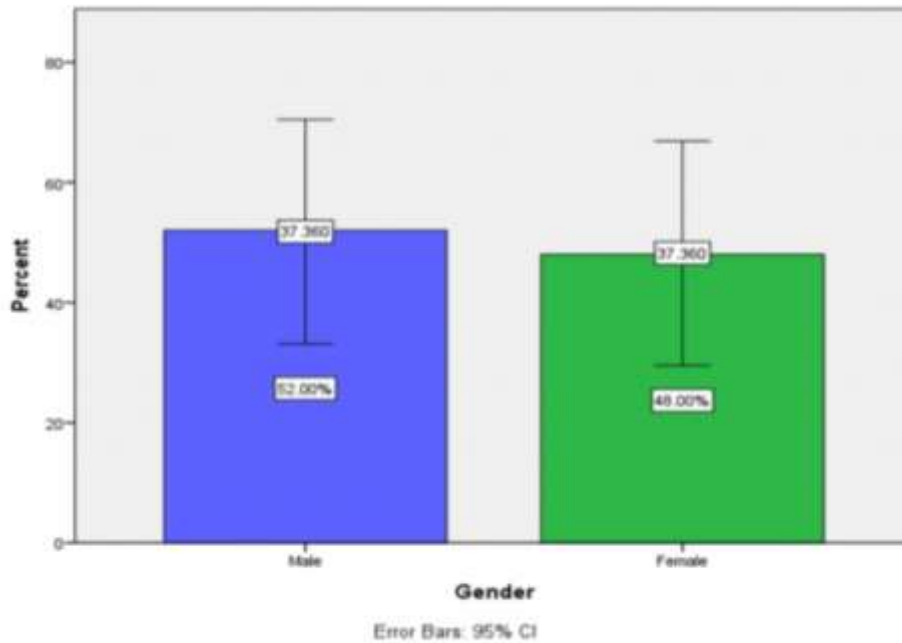


Figure 2- Bar graph showing the percentage distribution of gender, out of which 52% were male and 48% were females.

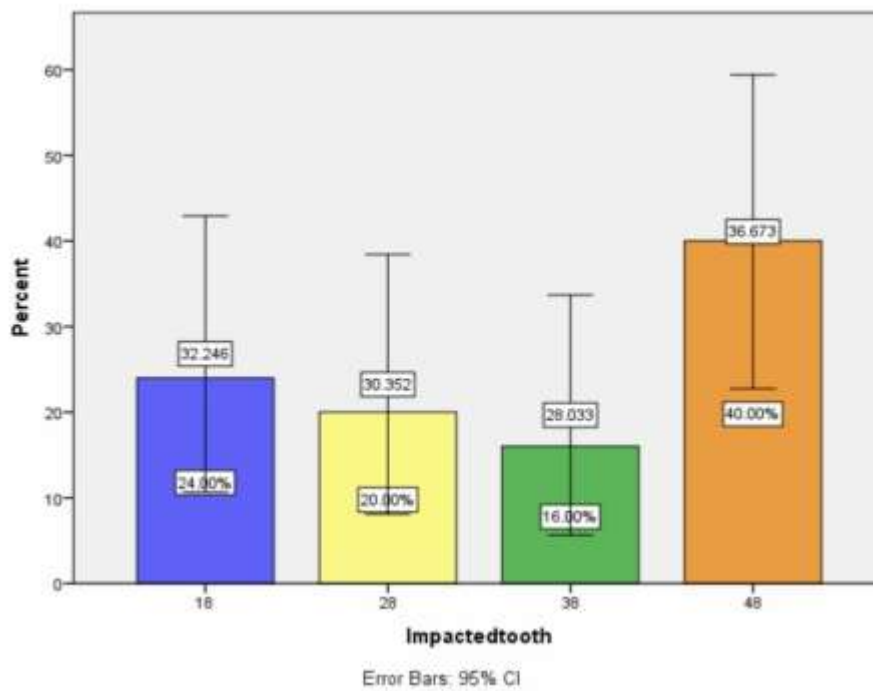


Figure 3 - Bar Graph showing the percentage distribution of surgical removal of impacted tooth, Prevalence of surgical extraction in mandibular right third molar(48) is 40%, maxillary right third molar(18) is 24%, maxillary left third molar(28) is 20% and mandibular left third molar(38) is 16%.

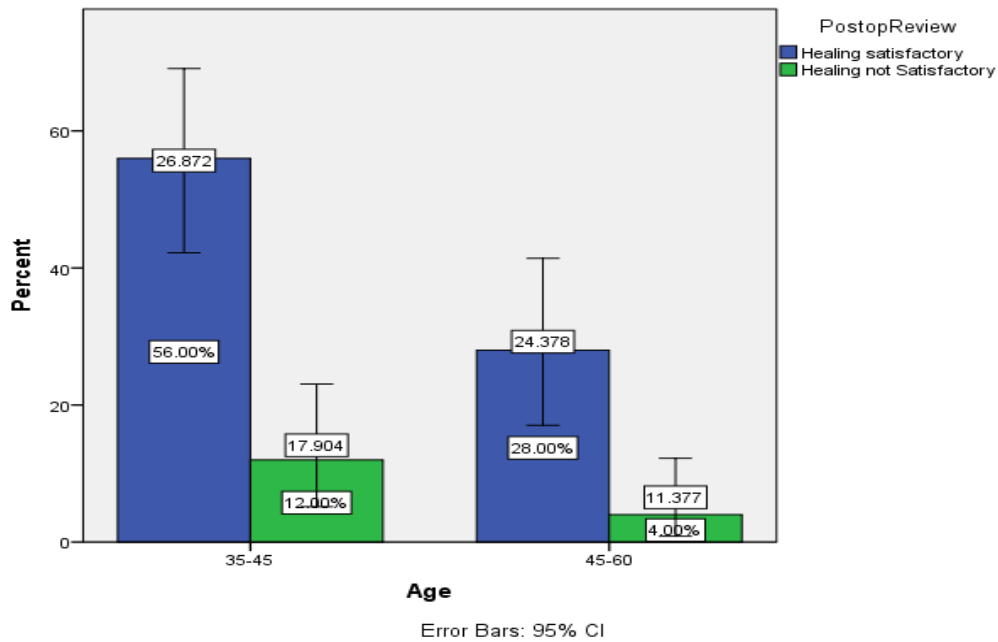


Figure 4 - Bar graph depicting association between age and postOp review in diabetic patients. X axis represents Age and Y axis represents PostOp review in diabetic patients. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000(p<0.005),Hence shows that Healing was not satisfactory in the 35-45 age group of 12%, whereas in the 45-60 age group of 4% shows that healing is not satisfactory.

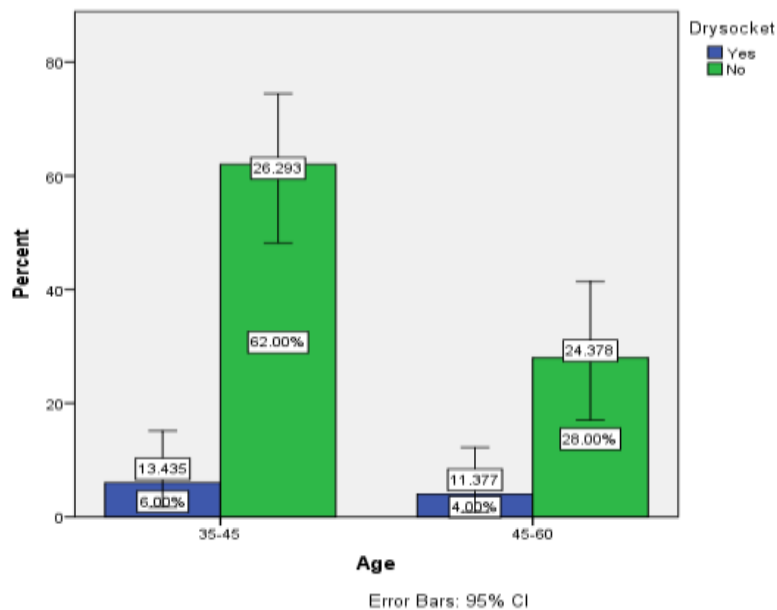


Figure 5 - Bar graph depicting association between age and prevalence of dry socket in diabetic patients. X axis represents Age and Y axis represents prevalence of dry socket in diabetic patients. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000(p<0.005),Hence shows that dry socket is seen in the 45-60 age group of 28%, whereas in the 35-45 age group only 62% shows dry socket.

### Discussion

In this study, the age groups most frequently associated with surgical extraction were 35-60years. The age group commonly associated with diabetic patients was 46-60 years of 60% than 35-45 years which is about 40%. The supporting studies for this study would be the incidence of surgical extraction in diabetic patients observed in Iranian population at 46-65 years of age. Previous studies in contrast with this study were prevalence and incidence of extraction study conducted by Harradine et al. (30)

The gender distribution in this study reveals a higher incidence of surgical removal of impacted teeth in males than females. The supporting studies for this study, which had higher prevalence of surgical removal of impacted teeth in

males, were found in a study conducted by Alsaleh et al. The study revealed a higher incidence of surgical removal of impacted teeth in males (52%) than females (48%). The previous study conducted by Fisher et al. revealed equal incidence of impacted teeth among males and females.(31) However, the study conducted by Abu Younis et al. reported no statistical association between surgical removal of extracted teeth and the patient's gender.

Surgical extraction includes the flap elevation with bone cutting. Frequently, the tooth may be split into multiple pieces in order to facilitate its removal. There were no contradictory studies with this study. The incidence of surgical removal of impacted teeth was greater in the lower right mandibular third molar (40%) than the lower left mandibular third molar(16%). The similar study contraindicated that surgical extraction was greater in the lower left mandibular than the lower right mandibular third molar. The previous literature study supported this study saying that higher incidence of impacted teeth is seen in mandibular teeth, especially molars. (32)The incidence in upper right maxillary third molar(24%) than upper left maxillary third molar(20%). There were no contradictory studies associated with this study. In this study, there is the highest prevalence of surgical extraction in mandibular molar.

The supporting studies for this study, which had higher prevalence of dry socket in males, were found in a study conducted by Alsalehetal.The study revealed higher prevalence of dry socket in 35-45 (6 %) than 46-60 (4%). The previous study conducted by Marcelo Carlos et al. revealed equal prevalence of dry socket among males and the females.

The study done by power et al says that the most common mode of extraction for diabetic patients is surgical extraction of impacted teeth.(33) Uncontrolled diabetics had significantly higher numbers of extracted teeth than the healthy non diabetic patient. So, uncontrolled blood glucose levels have a negative effect on the life span of teeth.(34) A study by Wang et al reported that tooth extraction in elderly patients with uncontrolled diabetes is considered as one of the triggering factors for osteonecrosis of the jaw, so dental extraction must be carried out with normal range of blood glucose levels. The uncontrolled diabetic patients may have delayed wound healing, the reason for the causes is still arguable. This study shows that surgical removal of impacted teeth in diabetic patients at a controlled level shows that healing is satisfactory, only some patients had delayed wound healing.

#### **Limitations**

This study covered only limited populations. The patients who reported to Saveetha Dental College and Hospitals were only considered. This study did not include all the teeth that underwent extraction. Rather it focused on the molar extraction.

#### **Conclusions:**

Within the limits of the study, it can be concluded that healing was more satisfactory in 35-45 age group and dry socket was more prevalent in the 45-60 age group in diabetic patients with impaction. The diabetic patients with dry socket were less than the diabetic patients without dry socket development. Therefore, this study concludes that the controlled diabetic patients who have undergone extraction of impacted teeth have good healing and had less development of dry socket and other complications

**Acknowledgement:** I would like to thank the Department of Oral and maxillofacial surgery ,Saveetha Dental college, Chennai for valuable inputs in this survey.

#### **Author Contributors:**

Data collection: BathalaAnanya  
Data analysis and Interpretation: BathalaAnanya  
Drafting the article: Bathala Ananya  
Critical Revision of the Article: Dr. ArunMurugaiyan  
Final approval of the version to be published: Dr. ArunMurugaiyan

#### **Conflict of interest:** Nil

**Funding:** The present project is sponsored by

- Saveetha institute of medical and technical sciences,
- Saveetha Dental College and Hospitals,
- Saveetha University and
- SatyamG land developers.

#### **References**

1. Peerlings RHJ. Treatment of a horizontally impacted mandibular canine in a girl with a Class II Division 1 malocclusion [Internet]. Vol. 137, American Journal of Orthodontics and Dentofacial Orthopedics. 2010. p. S154–62. Available from: <http://dx.doi.org/10.1016/j.ajodo.2008.08.025>
2. Padhye MN, Dabir AV, Girotra CS, Pandhi VH. Pattern of mandibular third molar impaction in the Indian population: a retrospective clinico-radiographic survey [Internet]. Vol. 116, Oral Surgery, Oral Medicine, Oral

- Pathology and Oral Radiology. 2013. p. e161–6. Available from: <http://dx.doi.org/10.1016/j.oooo.2011.12.019>
3. Shunmugavelu K. Rare occurrence of the left maxillary horizontal third molar impaction, the right maxillary third molar vertical impaction and the left mandibular third molar vertical impaction with inferior alveolar nerve proximity in a 30 year old female: a case report [Internet]. Vol. 27, Ethiopian Journal of Health Sciences. 2017. p. 101. Available from: <http://dx.doi.org/10.4314/ejhs.v27i1.14>
  4. Alsadat-Hashemipour M, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars-a radiographic study in a Southeast Iran population [Internet]. *Medicina Oral Patología Oral y Cirugía Bucal*. 2013. p. e140–5. Available from: <http://dx.doi.org/10.4317/medoral.18028>
  5. Tarazona B, Paredes V, Llamas JM, Cibrian R, Gandia JL. Influence of first and second premolar extraction or non-extraction treatments on mandibular third molar angulation and position. A comparative study [Internet]. *Medicina Oral Patología Oral y Cirugía Bucal*. 2010. p. e760–6. Available from: <http://dx.doi.org/10.4317/medoral.15.e760>
  6. Chiapasco M, De Cicco L, Marrone G. Side effects and complications associated with third molar surgery [Internet]. Vol. 76, *Oral Surgery, Oral Medicine, Oral Pathology*. 1993. p. 412–20. Available from: [http://dx.doi.org/10.1016/0030-4220\(93\)90005-o](http://dx.doi.org/10.1016/0030-4220(93)90005-o)
  7. Friedman JW. The prophylactic extraction of third molars: a public health hazard. *Am J Public Health*. 2007 Sep;97(9):1554–9.
  8. Slade GD, Foy SP, Shugars DA, Phillips C, White RP Jr. The impact of third molar symptoms, pain, and swelling on oral health-related quality of life. *J Oral Maxillofac Surg*. 2004 Sep;62(9):1118–24.
  9. Song F. The effectiveness and cost-effectiveness of prophylactic removal of wisdom teeth. 2000. 55 p.
  10. J PC, Pradeep CJ, Marimuthu T, Krithika C, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study [Internet]. Vol. 20, *Clinical Implant Dentistry and Related Research*. 2018. p. 531–4. Available from: <http://dx.doi.org/10.1111/cid.12609>
  11. Wahab PUA, Abdul Wahab PU, Madhulaxmi M, Senthilnathan P, Muthusekhar MR, Vohra Y, et al. Scalpel Versus Diathermy in Wound Healing After Mucosal Incisions: A Split-Mouth Study [Internet]. Vol. 76, *Journal of Oral and Maxillofacial Surgery*. 2018. p. 1160–4. Available from: <http://dx.doi.org/10.1016/j.joms.2017.12.020>
  12. Mudigonda SK, Murugan S, Velavan K, Thulasiraman S, Krishna Kumar Raja VB. Non-suturing microvascular anastomosis in maxillofacial reconstruction- a comparative study. *Journal of Cranio-Maxillofacial Surgery*. 2020 Jun 1;48(6):599–606.
  13. Narayanasamy RK, Muthusekar RM, Nagalingam SP, Thyagarajan S, Ramakrishnan B, Perumal K. Lower pretreatment hemoglobin status and treatment breaks in locally advanced head and neck squamous cell carcinoma during concurrent chemoradiation. *Indian J Cancer*. 2021 Jan;58(1):62–8.
  14. Wang H, Chinnathambi A, Alahmadi TA, Alharbi SA, Veeraraghavan VP, Krishna Mohan S, et al. Phyllanthin inhibits MOLT-4 leukemic cancer cell growth and induces apoptosis through the inhibition of AKT and JNK signaling pathway. *J BiochemMolToxicol*. 2021 Jun;35(6):1–10.
  15. Li S, Zhang Y, Veeraraghavan VP, Mohan SK, Ma Y. Restorative Effect of Fucoxanthin in an Ovalbumin-Induced Allergic Rhinitis Animal Model through NF- $\kappa$ B p65 and STAT3 Signaling. *J Environ PatholToxicolOncol*. 2019;38(4):365–75.
  16. Ma Y, Karunakaran T, Veeraraghavan VP, Mohan SK, Li S. Sesame Inhibits Cell Proliferation and Induces Apoptosis through Inhibition of STAT-3 Translocation in Thyroid Cancer Cell Lines (FTC-133). *Biotechnol Bioprocess Eng*. 2019 Aug 1;24(4):646–52.
  17. Bishir M, Bhat A, Essa MM, Ekpo O, Ihunwo AO, Veeraraghavan VP, et al. Sleep Deprivation and Neurological Disorders. *Biomed Res Int*. 2020 Nov 23;2020:5764017.
  18. Fan Y, Maghimaa M, Chinnathambi A, Alharbi SA, Veeraraghavan VP, Mohan SK, et al. Tomentosin Reduces Behavior Deficits and Neuroinflammatory Response in MPTP-Induced Parkinson's Disease in Mice. *J Environ PatholToxicolOncol*. 2021;40(1):75–84.
  19. Zhang C, Chen Y, Zhang M, Xu C, Gong G, Veeraraghavan VP, et al. Vicenin-2 Treatment Attenuated the Diethylnitrosamine-Induced Liver Carcinoma and Oxidative Stress through Increased Apoptotic Protein Expression in Experimental Rats. *J Environ PatholToxicolOncol*. 2020;39(2):113–23.
  20. Gan H, Zhang Y, Zhou Q, Zheng L, Xie X, Veeraraghavan VP, et al. Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats. *J BiochemMolToxicol*. 2019 Oct;33(10):e22387.
  21. Saravanakumar K, Park S, Mariadoss AVA, Sathiyaseelan A, Veeraraghavan VP, Kim S, et al. Chemical composition, antioxidant, and anti-diabetic activities of ethyl acetate fraction of *Stachysriederi* var. *japonica* (Miq.) in streptozotocin-induced type 2 diabetic mice. *Food ChemToxicol*. 2021 Jun 26;155:112374.
  22. Veeraraghavan VP, Hussain S, PapayyaBalakrishna J, Dhawale L, Kullappan M, Mallavarapu Ambrose J, et al. A Comprehensive and Critical Review on Ethnopharmacological Importance of Desert Truffles: *Terfeziaclaveryi*, *Terfeziaboudieri*, and *Tirmanianivea*. *Food Rev Int*. 2021 Feb 24;1–20.
  23. Wei W, Li R, Liu Q, DevanathadesikanSeshadri V, Veeraraghavan VP, Surapaneni KM, et al. Amelioration of oxidative stress, inflammation and tumor promotion by Tin oxide-Sodium alginate-Polyethylene glycol-Allylthiocyanatenanocomposites on the 1,2-Dimethylhydrazine induced colon carcinogenesis in rats. *Arabian*

- Journal of Chemistry. 2021 Aug 1;14(8):103238.
24. Sathya S, Ragul V, Veeraraghavan VP, Singh L, NiyasAhamed MI. An in vitro study on hexavalent chromium [Cr(VI)] remediation using iron oxide nanoparticles based beads. *Environmental Nanotechnology, Monitoring & Management*. 2020 Dec 1;14:100333.
  25. Chandrasekar R, Chandrasekhar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. *ProgOrthod*. 2020 Oct 12;21(1):38.
  26. Ramakrishnan M, Dhanalakshmi R, Subramanian EMG. Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry – A systematic review [Internet]. Vol. 31, *The Saudi Dental Journal*. 2019. p. 165–72. Available from: <http://dx.doi.org/10.1016/j.sdentj.2019.02.037>
  27. Felicita AS, Sumathi Felicita A. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor – The sling shot method [Internet]. Vol. 30, *The Saudi Dental Journal*. 2018. p. 265–9. Available from: <http://dx.doi.org/10.1016/j.sdentj.2018.05.001>
  28. Su P, Veeraraghavan VP, Krishna Mohan S, Lu W. A ginger derivative, zingerone-a phenolic compound-induces ROS-mediated apoptosis in colon cancer cells (HCT-116). *J BiochemMolToxicol*. 2019 Dec;33(12):e22403.
  29. Wan J, Feng Y, Du L, Veeraraghavan VP, Mohan SK, Guo S. Antiatherosclerotic Activity of Eriocitrin in High-Fat-Diet-Induced Atherosclerosis Model Rats. *J Environ PatholToxicolOncol*. 2020;39(1):61–75.
  30. Harradine NW, Pearson MH, Toth B. The effect of extraction of third molars on late lower incisor crowding: a randomized controlled trial [Internet]. Vol. 25, *British Journal of Orthodontics*. 1998. p. 117–22. Available from: <http://dx.doi.org/10.1093/ortho/25.2.117>
  31. Fisher WC. Recovery of second mandibular molar after collapse in space made by early extraction of first molar bringing second molar into position occupied by first molar and making room for impacted third molar [Internet]. Vol. 14, *International Journal of Orthodontia, Oral Surgery and Radiography*. 1928. p. 945–7. Available from: [http://dx.doi.org/10.1016/s0099-6963\(28\)90026-5](http://dx.doi.org/10.1016/s0099-6963(28)90026-5)
  32. Patturaja K, Pradeep D. Awareness of Basic Dental Procedure among General Population [Internet]. Vol. 9, *Research Journal of Pharmacy and Technology*. 2016. p. 1349. Available from: <http://dx.doi.org/10.5958/0974-360x.2016.00258.4>
  33. Power DJ, Sambrook PJ, Goss AN. The healing of dental extraction sockets in insulin-dependent diabetic patients: a prospective controlled observational study. *Aust Dent J*. 2019 Mar;64(1):111–6.
  34. Fernandes KS, Glick M, de Souza MS, Kokron CM, Gallottini M. Association between immunologic parameters, glycemic control, and postextraction complications in patients with type 2 diabetes. *J Am Dent Assoc*. 2015 Aug;146(8):592–9.